

BANG DISEASE

(Infectious Abortion)

With Rules and Regulations for the Establishment
and Maintenance of Bang Disease (Infectious
Abortion) Free Accredited Herds of Cattle

and a short review of

Undulant Fever in Man

and its Relation to Bang Disease in Animals

by

DR. W. J. BUTLER



Contribution from the

MONTANA LIVESTOCK SANITARY BOARD
LABORATORIES

March 1, 1930

VOLUME I.

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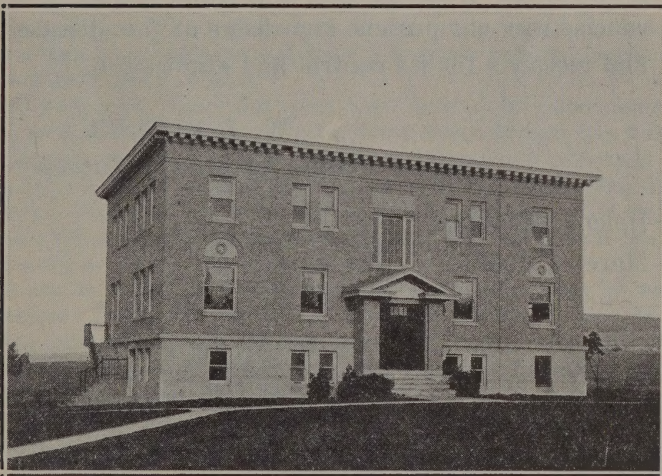
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To the Stockmen of Montana:

There is a confusion of ideas and much false information being circulated with reference to Bang disease (Infectious Abortion). In this pamphlet we have endeavored to present to you in a concise way our present knowledge of this disease and methods for its control and eradication.

W. J. BUTLER,
State Veterinary Surgeon.

Helena, Montana,
March 1, 1930.

BANG DISEASE (Infectious Abortion)

by

Dr. W. J. Butler

This disease is sometimes called Contagious Abortion, Infectious Abortion, Abortion Disease, Bang Bacillus Disease, but its proper name is Bang Disease. The disease is caused by a specific organism known as the *Brucella Abortus* or Bang Bacillus. Abortion is only one of the symptoms of this disease and is not the actual disease itself.

At this time there is no known specific medicine nor specific vaccine for the cure or prevention of Bang Disease (Infectious Abortion).

There is a living virus vaccine that will tend to prevent actual abortion. Its use, however, spreads Bang Disease and may increase the number of non-breeders and cause other disease conditions that are associated with Bang Disease. Moreover, when once the use of this living virus vaccine is started, to be successful in controlling actual abortion, it must be kept up indefinitely and each breeding animal, previous to its being bred, must be vaccinated each year. Living virus vaccine if used in a pregnant animal may cause that animal to abort and may permanently infect her with Bang Disease.

Many supposedly medicinal cures have secured favorable recognition due to the fact that animals suffering from Bang Disease may naturally gain immunity to the symptom abortion and give birth to normal living calves, although they themselves may be suffering from Bang Disease (Infectious Abortion) and even may be actual spreaders of the disease. Naturally when a medicine has been given to such an animal the medicine gets the credit for the apparent cure.

It is not to be inferred from this that animals may not be cured of this disease. There are records of apparent absolute cures. In some cases the infected animals have overcome the disease naturally without the aid of medicines. In other cases the cure has followed systematic sanitary and medicinal treatment but so far all of these cures have occurred in sporadic or occasional individual cases and have not been of a general character.

By cure we mean where the animal no longer gives a positive reaction but gives a negative reaction to the blood test for Bang Disease and not simply where an animal no longer aborts.

Practically every research laboratory in the United States is working on this disease. The Montana Livestock Sanitary Board is carrying on experiments with the intravenous injections of aniline dyes as a cure. There is every hope that a specific cure and preventative will be found but as yet such a cure or preventative is not known.

Bang Disease affects cattle of all ages and breeds. It may affect the bull as well as the female. It does not permanently infect unsexed animals.

The bull we believe is a lesser factor in the spread of Bang Disease

(Infectious Abortion) than the female. Some authorities go so far as to say that the bull is a negligible factor in the spread of this disease. It has been proved, however, that the bull may and occasionally does spread Bang Disease.

The infected cow spreads the disease shortly before, during and after calving through the contaminated afterbirth and discharges. She may also spread the disease through her contaminated milk. The bull seldom if ever spreads the disease, unless he himself is infected.

It is through contaminated feed and not by breeding that the disease usually gains entrance into an animal's body. Grass or other foods or water are contaminated by the discharges from the infected cow. Susceptible animals come along and eat that contaminated food or drink that contaminated water. Infection may also be spread by direct licking and occasionally by direct breeding.

The pregnant cow is the most susceptible to the disease. Sexually immature cattle may become temporarily infected but invariably will lose that infection if removed, before they become sexually mature, from infected premises and infected cows.

The ideal way to eradicate and control Bang Disease is to blood test all breeding animals in a herd and remove all infected animals and clean and disinfect the infected premises. No breeding animals should be added to or come in contact with a clean herd unless they have given a negative reaction to the blood test made before they have been bred or made not less than thirty days after they have calved. With our present methods of testing, a negative blood test on a pregnant cow may not be relied upon as being accurate.

In dairy herds and in strictly pasture herds where segregation of reactors may be practiced we recommend the blood testing of all breeding animals and the immediate removal of reactors and the cleaning and disinfection of the premises. If there are only a few reactors they should be immediately disposed of to the butcher. If there are a number of reactors, approximately ten per cent or more, we recommend the establishment of two herds, a clean herd and a reactor herd, providing of course that it is economical to do so and the pastures or premises are suited for such a procedure.

The reactor herd must be separated from the clean herd by a lane or pasture. A wire or pole fence is not sufficient. The drainage from the reactor herd should not contaminate the pasture or the enclosure that contains the clean herd. Workers should not go directly from the reactor herd to the clean herd unless they carefully wash their hands and clean their shoes or boots or remove their overshoes. Neither should curry combs, brushes or other such implements be used on the reactor herd and then on the clean herd.

The clean herd may be gradually built up from the calves produced by the reactor herd. These calves after weaning must be removed from the reactor herd and kept on uncontaminated premises (but not with the clean herd) for thirty days and then subjected to a blood test. If at the end of this thirty day period they give a negative reaction to the blood test for Bang Disease they may be added to the clean herd.

No breeding animal should be added to the clean herd unless it gives a negative reaction to the blood test. It is even advisable to isolate all

such animals on uncontaminated premises and require them to pass a second blood test made not earlier than sixty days from date of isolation, before adding them to the clean herd.

Pregnant animals should not be added to the clean herd unless they come directly from a Bang Disease (Infectious Abortion) Free Accredited Herd. Pregnant animals should be isolated on uncontaminated premises until they pass a negative blood test made not less than thirty days after they have calved. If at the end of that time they successfully pass the blood test they may be added to the clean herd.

Under range conditions it is impossible to fulfill the requirements of this ideal method. We can, however, follow certain definite plans which will help very materially to control Bang Disease.

The limiting of the breeding period is an important factor in the range control of Bang Disease. In as much as the great majority of cows only spread the disease (excepting through their milk) at calving time through their discharges it naturally follows that if the calving of the herd is confined to a limited period the major danger of spreading the disease will be limited to that space of time and not spread over the entire year as is the case in dairy cattle and cattle raised under eastern conditions.

Premature births or abortions will of course lengthen this period of danger. Ordinarily premature births (abortions) will be fewer than natural or mature births and will take place in most instances about the seventh month of pregnancy. Whenever an animal shows signs of aborting (premature calving) she should be isolated and if she aborts the afterbirth and foetus should be burned. The ground upon which the afterbirth and foetus has lain should be sprinkled with a disinfectant and covered with lime. Animals that are not discovered until after they have aborted should be isolated from breeding animals until all discharges have ceased.

The law in Montana and the custom that prohibits bulls from being turned out on the range between January 1st and July 1st of each year undoubtedly has done much to prevent the spread of Bang Disease in range cattle. The fact that beef cattle have a short lactation (milk giving) period is also a definite factor in lessening the spread of this disease in beef cattle.

During the calving period cows should be handled so that they calve in a pasture by themselves or with steers. Every effort should be made to keep them from calving in a pasture that contains pregnant cows.

Under range conditions where it is impractical to blood test all breeding animals in the herd and to segregate and keep segregated all reactors we believe that it is not advisable to dispose of animals that abort. The infection is already in the herd. Under the natural course of events the animal that has aborted will gain immunity to actual abortion while additions to the herd may prove to be more susceptible to the infection. Non-breeders and udder trouble such as garget are associated symptoms of Bang Disease. When an animal that aborts becomes a non-breeder or develops a persistent garget it should be fattened and sent to the butcher. An animal that aborts should never be sold excepting for slaughter unless it passes a negative blood test for Bang Disease (Infectious Abortion).

The principal factors to be observed in controlling and eradicating Bang Disease, briefly stated, are as follows:

1. Blood test all breeding cattle and remove reactors.
2. Blood test all breeding animals including calves to be added to a clean herd. Add only animals that give a negative reaction to the blood test.
3. Limit breeding period.
4. Use only bulls free from Bang Disease.
5. Have cows calve in a pasture or enclosure by themselves or at least away from breeding animals and especially pregnant cows.
6. Burn or properly destroy all after births. Clean and disinfect infected premises and keep them clean. Do not permit animals to nibble at or graze over manure piles.
7. Do not breed an animal until all discharges have ceased.

THE BLOOD TEST

The blood test referred to and which we use for the diagnosis of Bang Disease (Infectious Abortion) is known as the Agglutination test. It is based upon the principle that in the blood of infected animals there are formed complex chemical substances known as Agglutinins. These Agglutinins, in the presence of their homologus antigen, will cause a clumping or coherence of the bacteria that produce the infection.

In the blood test for Bang Disease this homologus antigen is a suspension of the *Brucella Abortus* (the organism that causes infectious abortion) of a definite density or number of bacteria in a normal salt solution.

Three tests are made of the serum from each individual cow. In one test tube is placed $\frac{4}{100}$ of 1 c.c. of serum. In another $\frac{2}{100}$ of 1 c.c. of serum. In the third test tube there is placed $\frac{1}{100}$ of 1 c.c. of serum. To each of these test tubes is added one cubic centimeter (16 drops) of antigen. These tubes are whirled around by hand to mix the serum and antigen. They are then placed in an incubator and held at blood heat temperature for forty eight hours.

If at the end of that time there is a settling out and a clumping of bacteria in small white flakes at the bottom of any one of these tubes it is evidence that the serum or blood came from an animal affected with Bang Disease (Infectious Abortion).

If there is no settling out or clumping of bacteria and the solution remains opaque then it is evidence that the serum came from an animal free from Bang Disease (Infectious Abortion).

Three dilutions and three tests are made of each blood sample simply as a check. Agglutination in any one of these dilutions is considered conclusive evidence of infection. Agglutination in the high dilutions as well as the low dilutions is simply an indication of degree or intensity of infection.

Instructions to Deputy State Veterinary Surgeons for Collecting Blood from Cows.

Blood is best obtained from the jugular vein. In emergency cases when you do not have the proper needle the blood may be obtained from the end of the tail by cutting off the button found at the very tip or end of the tail.

Cows' blood does not coagulate as quickly as horses' blood and it hemolyzes much more readily.

In collecting blood from cattle to be sent to a laboratory for a blood test, be very careful to see that the bottles in which the blood is drawn are absolutely dry inside. If there is any moisture inside the bottle the blood is liable to hemolyse and make a laboratory blood test impossible.

After the blood has been drawn into the container lay the container on its side at an angle for an hour or until the blood coagulates and do not subject the blood to any jiggling or agitation. Before the container is laid down on its side, however, it may be whirled around in a circular motion for a couple of minutes which will tend to have the clot go to the center and facilitate coagulation and the withdrawal of the serum. It is always advisable to withdraw the serum and send only the serum into the laboratory. A preservative is not necessary when the serum will reach the laboratory within a reasonable time. One or two ounces of blood will give sufficient serum.

It is also to be remembered that a clean needle must be used for every animal. If an uncleaned needle is used for a second animal and the blood of the first animal happened to contain antibodies, enough blood may adhere to the inside of the needle to cause the blood of the second animal to give a partial or positive reaction.

Needles for the withdrawing of blood must be washed in separate water and never washed in the same water, even though that water may contain an antiseptic. An antiseptic will not destroy antibodies and if needles are washed in the same water, after a number of samples have been taken, it is quite possible for the water to contaminate the needles. A clean separate needle must be used for every cow or it must be washed in separate water and thoroughly dried.

It is also requested that you exercise every care in the proper labeling of the bottles and that the blood stained cork of one bottle is never transferred to another bottle.

Containers for collecting and forwarding blood will be furnished upon request.

Observation of these points will assist this laboratory and will tend very materially to prevent mistaken diagnoses.

The Montana Livestock Sanitary Board have provided the following rules and regulations for the establishment and maintenance of Bang Disease (Infectious Abortion) Free Accredited Herds of Cattle.

1. Bang Disease (Bovine infectious abortion) or Bang Bacillus disease shall mean the disease wherein any animal is infected with the Bang Bacillus (*Brucella Abortus*) irrespective of the occurrence or absence of an abortion.

2. The test tube agglutination blood test shall be the official test for the prevention, control and eradication of Bang Disease (Bovine infectious abortion) in Montana.

3. A Bang Disease (Bovine infectious abortion) Free Accredited Herd is one in which no evidence of Bang Disease (Bovine infectious abortion) has been found in three blood tests at least six months apart, of all cattle, including all calves, in the herd.

4. The owner must place his herd under the supervision of the Montana Livestock Sanitary Board for the prevention, control and eradication of Bang Disease (Bovine infectious abortion).

5. A list of the cattle to be blood tested shall be furnished the Montana Livestock Sanitary Board at each time a test is applied, so that each blood sample can be identified. For the purpose of permanent identification each animal must be identified by the name and registry number, ear tag or tattoo number or individual brand.

6. The collection of blood and the proper identification of each animal and the supervision of the necessary sanitary procedures shall be made by a veterinarian approved by the Montana Livestock Sanitary Board. Deputy state veterinary surgeons when available will be employed at the expense of the Montana Livestock Sanitary Board. The owner, however, shall have the right to employ, at his own expense, any veterinarian approved by the Montana Livestock Sanitary Board.

7. All reacting animals shall be removed immediately from the herd and placed and quarantined in a herd entirely separate from the non-reacting herd or may be shipped for slaughter.

8. Retests of herds in which reactors are disclosed shall be made not earlier than thirty days nor later than ninety days from the date of last test of such herds.

9. A Bang Disease (Bovine infectious abortion) Free Accredited Herd shall be retested at least annually. If reactors are disclosed in such a herd its Bang Disease (Bovine infectious abortion) Free Accredited Herd certificate shall be automatically suspended. Before the certificate will again be valid the entire herd must pass three negative blood tests six months apart as provided for in paragraph 3.

10. When an abortion occurs in an Accredited Herd it must be reported immediately to the Montana Livestock Sanitary Board. The aborting animal must be isolated immediately and the place where the abortion occurred must be cleaned and disinfected immediately and the foetus and membranes burned or buried and covered with quick-lime.

11. Herd bulls must not be used for service on cattle which have not been blood tested and found free from bovine infectious abortion.

12. All milk and milk products used in a Bang Disease (Bovine infectious abortion) Free Accredited Herd or herds in the process of accreditation shall be produced either by a Bang Disease (Bovine infectious abortion) Free Accredited Herd or shall be properly pasteurized.

13. The Montana Livestock Sanitary Board must be notified immediately when cattle are returned or added to a Bang Disease (Bovine infectious abortion) Free Accredited Herd or a herd in the process of accreditation.

14. Cattle from a Bang Disease (Bovine infectious abortion) Free Accredited Herd may be added to such herd or herds in the process of accreditation without test provided they are moved in such a manner as not to be exposed to infection. If shipped by railroad the car or cars used must be cleaned and disinfected. Public stock yards or public loading yards must be avoided.

15. All cattle with the exception of calves under six months of age to be added to an Accredited Herd or a herd in the process of accreditation, other than cattle from a Bang Disease (Bovine infectious abortion) Free Accredited Herd, must pass a negative blood test and then must be isolated until they have passed a second blood test made not earlier than sixty days from the date of isolation. Calves under six months of age may be added after having passed one negative test.

16. Pregnant animals, other than those from an accredited herd, to be added to a Bang Disease (Bovine infectious abortion) Free Accredited Herd or a herd in the process of accreditation must be isolated until after having calved and until they have passed a negative blood test not earlier than thirty days after having calved.

17. Cattle removed from the farm or ranch for exhibition or any other purpose shall not be returned to a Bang Disease (Bovine infectious Abortion) Free Accredited Herd or a herd in the process of accreditation until they have been held in isolation for a period of sixty days and at the end of that time have passed a negative blood test.

18. No herd will be placed under supervision, the owner of which is not practicing measures against and co-operating in the eradication of tuberculosis.

19. Premises in which a Bang Disease (Bovine infectious abortion) Free Accredited Herd or a herd in the process of accreditation is maintained must be kept in a sanitary condition. After the removal of any animal infected with Bang Disease (Bovine infectious abortion) the stable and premises must be cleaned and disinfected under official supervision or direction.

20. Blood tests shall be made at the Montana Livestock Sanitary Board laboratory or a laboratory approved by the Board. There shall be no charge for blood tests made by the Livestock Sanitary Board Laboratory.

21. Bang Disease (Bovine infectious Abortion) Free Accredited Herd certificates shall be issued to owners of herds in which no reactors have been found as required by paragraph three, provided these rules and regulations and the co-operative agreement executed by the owner have been complied with. Such certificates shall be valid for one year from date issued unless cancelled.

AGREEMENT

For the purpose of freeing my herd of Bang Disease (Bovine infectious abortion) I, do hereby agree to cooperate with the Montana Livestock Sanitary Board and to meet the requirements and provisions incorporated in this agreement.

I do further agree to furnish sufficient help to assist the veterinarian in securing the necessary blood specimens, tagging and identifying my cattle.

I do further agree to cause all animals that react to the test, and also all animals showing physical evidence of infectious abortion, to be promptly disposed of in a manner satisfactory to the Montana Livestock Sanitary Board.

I do further agree not to allow any vaccine, bacterin or other biological product to be used on my herd for the prevention or treatment of Bang Disease (Bovine infectious abortion) without first securing a permit for its use from the Montana Livestock Sanitary Board.

I do further agree to allow any of my premises contaminated by animals infected with Bang Disease (Bovine infectious abortion) as indicated by a blood test or by a physical examination, to be thoroughly cleaned and disinfected, at my own expense, under the direction or supervision of the Montana Livestock Sanitary Board.

I do further agree to comply with the Montana Livestock Sanitary Board Rules and Regulations providing for the prevention, control and eradication of Bang Disease (Bovine infectious abortion) and for the establishment and maintenance of Bang Disease Free Accredited Herds of cattle which Rules and Regulations are adopted by all parties concerned and entered as a part of this agreement. Failure on my part to comply with these Rules and Regulations shall be sufficient cause for the cancellation of this agreement.

My herd is composed of.....
(Breed)

Number of Cattle.....
(Pure Bred) (Grade) (Total)

IN WITNESS WHEREOF, I have signed this agreement this..... day of....., one thousand nine hundred and

Owner.....
Witness..... Post Office.....
County

The Montana Livestock Sanitary Board regulations governing Bang Disease (Infectious Abortion) as officially designated in their Regulation No. 25, as Amended March 1, 1930, are as follows:

BANG DISEASE (Infectious Abortion)

Defining Bang Disease (Infectious Abortion)

Section 1, Paragraph 1. Bang Disease (Infectious Abortion) shall mean the disease wherein any animal is infected with the *Brucella abortus* (Bang bacillus) irrespective of the occurrence or absence of an abortion.

Paragraph 2. An animal shall be declared infected with *Brucella abortus* (Bang bacillus) if it has given a positive reaction to the blood test or any other recognized test for Bang disease (Infectious abortion) or if the *Brucella abortus* (Bang bacillus) has been found in the body or its secretions or discharges, or if it has been treated with a live culture of *Brucella abortus* (Bang bacillus).

Section 2, Paragraph 1. Animals affected with Bang Disease (Infectious Abortion) as defined in Section 1 of these regulations shall not be sold, given away or removed from the premises except under permit. Permits for the removal of affected animals will be issued by the Montana Livestock Sanitary Board under the conditions that their destination shall be immediate slaughter or infected herds; or that their destination shall be such as not to expose them to healthy animals.

Paragraph 2. Animals reacting to the blood test for Bang Disease (Infectious Abortion) or which are known to be infected with Bang Disease (Infectious Abortion) as defined in Section 1 of these regulations, shall be tagged in the left ear with a serial numbered metal tag bearing the inscription, "Montana abortion reactor." Such animals shall not be permitted to come in contact with animals other than in the herd in which they are held.

Paragraph 3. In each and every case where animals, affected with Bang Disease (Infectious Abortion) as defined in Section 1 are to be given away, sold or offered for sale, the condition of their health shall be properly represented and they must be represented as infected animals.

Paragraph 4. No animal which is suffering from Bang Disease (Infectious Abortion) and which has aborted shall be bred within at least 60 days from date of aborting and until all discharges have ceased.

Paragraph 5. All dead fetuses, membranes, afterbirths, and other material shall be immediately destroyed by burning or proper burial, and the infected premises or grounds properly cleaned and disinfected.

Paragraph 6. Animals which have given a positive reaction to the blood test for Bang Disease (Infectious Abortion) or which are known to be infected with the *Brucella abortus* (Bang bacillus) may have the "Abortion Reactor" tag removed by a representative of the Montana Livestock Sanitary Board and will be released from the restrictions

placed upon such animals provided that subsequent to the finding of infection they pass two negative blood tests for Bang Disease, made not less than sixty days apart and made when the animal is not pregnant, and provided the animal is held on uncontaminated premises between the two subsequent tests.

Section 3, Paragraph 1. Animals which give a negative reaction to the blood test for Bang Disease (Infectious Abortion) and which are held in such a manner as to guard against Bang Disease (Infectious Abortion) infection may be tagged in the right ear, when the owner so desires or the Livestock Sanitary Board considers it advisable, with a serial numbered metal tag bearing the inscription, "Montana abortion passed."

UNDULANT FEVER IN MAN

There is apparently a relation between Bang Disease or Infectious Abortion of cattle and other animals and Undulant Fever, a communicable disease, in man.

Undulant Fever or Malta Fever in man until recently was presumed to be caused by the *Brucella melitensis*, the causative agent of a disease in goats somewhat similar to Infectious Abortion in cattle.

Within the last six years, however, Evans and other workers have demonstrated that the *Brucella melitensis* and the *Brucella abortus* are very closely related if not the one and the same organism masquerading under different names.

Undulant Fever, as its name implies, is a disease characterized by wave-like fluctuations in temperature—an up and down fever. Profuse sweating, constipation and rheumatic pains are associated symptoms of the disease, not unlike Flu or a low form of Typhoid. It is particularly characterized, however, by its tendency to drag along over a considerable period of time.

Male and female are apparently equally susceptible. Children, however, are exceptionally resistant to the disease.

*Van Es in his exceptionally able presentation on this subject makes the following statements:

“From the evidence now available it becomes possible to recognize certain concrete facts worthy of mention. It must be regarded as quite definitely proven that the *Brucella abortus* commonly associated with farm livestock may be the cause of human sickness. It may be true that the conditions which determine this pathogenicity are not all known but the fact remains that we must reckon with a cow or hog borne Undulant Fever. * * * * *

“In the light of present day knowledge of the subject it appears that actual infections are out of all proportions to the infection opportunities. Man does not readily contract the disease and even if more or less continually exposed may escape with sensitization only, unless special secondary factors, as yet unknown, enter into the case.

“The cow borne disease has not yet shown any characteristic which would permit its inclusion among endemic or epidemic diseases. Records of transmission from man to man are extremely rare in literature and the occurrence of Undulant Fever in more than one person in a given family is even more rare.”

We consider that present day knowledge justifies the conclusion that Undulant Fever may be regarded as an occupational disease even though the disease may occasionally be transmitted through the drinking of infected milk. It is most commonly a disease of the butcher, the farmer, the stockgrower, the veterinarian or those whose occupation or work brings them in direct contact with animals infected with Bang Disease (Infectious Abortion).

To guard against this contact infection, rubber gloves should be worn

* Undulant Fever in Man and its Relation to Abortion Disease in Farm Livestock, by L. Van Es.



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when handling afterbirths or membranes from infected animals or when cleaning such animals. Hands should be washed with warm water and soap and then rinsed in a disinfectant solution after working around infected animals and especially before eating or handling food of any kind. Workers with cuts or abrasions on their hands must be particularly careful when handling infected material.

The fact that the *Brucella abortus* of animals may cause Undulant Fever in man justifies Livestock Sanitary Officials in restricting the use of Living Virus Vaccines for the control of abortion and especially so in dairy herds.